

Economics 5250/6250
Fall 2009

Dr. Lozada
Midterm Exam

This exam has 33 points. There are six questions on the exam; you should work all of them. Half the questions are worth 5 points each, while the other half are worth 6 points each.

Put your answers to the exam in the blue books you have brought.

Answer the questions using as much precision and detail as the time allows. Correct answers which are unsupported by explanations will not be awarded points. Therefore, even if you think something is “obvious,” do not omit it. If you omit anything, you will not get credit for it. You get credit for nothing which does not explicitly appear in your answer.

Answer all of the following six questions.

1. [5 points] What is the relevance of the Theory of the Second Best to environmental economics?
2. [6 points] Suppose that producing output also generates pollution. Draw a graph with “output” on the horizontal axis showing how an optimal (linear) “pollution reduction subsidy” (really an output reduction subsidy) would work.
3. [6 points] Suppose the government regulates pollution by imposing a marketable permit system (“cap and trade”).
 - (a) Using a graph with pollution on the horizontal axis and “dollars per unit of pollution” on the vertical axis, draw a Marginal Abatement Cost curve and explain why it is the demand curve for permits.
 - (b) What does the optimal supply curve for permits look like?
 - (c) What determines the equilibrium price of permits?
4. [6 points] Use a graph to illustrate one situation where “willingness to pay” will not equal “willingness to accept.”
5. [5 points] What is the “polluter pays” principle? Is it always true?
6. [5 points] Contrast utilitarian, contractarian, and libertarian notions of justice.

Answers to Econ. 5250 Midterm,

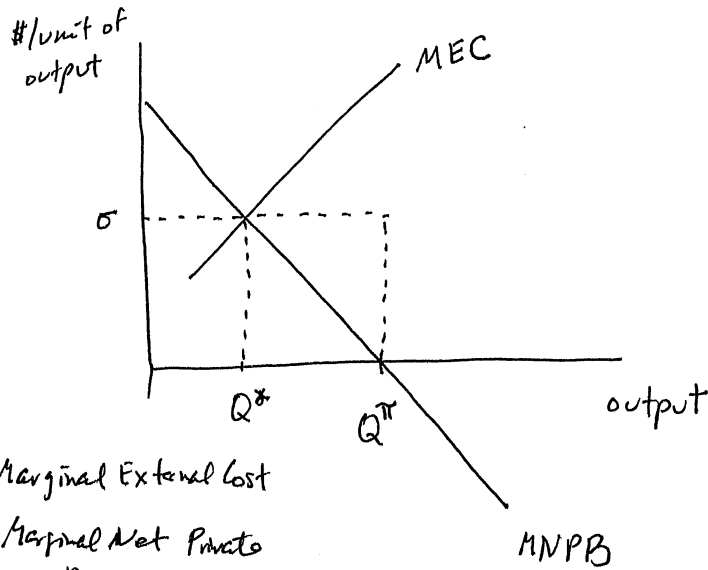
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- ① The Theory of the Second Best says that removing a market imperfection is guaranteed to improve social welfare (i.e., guaranteed to be a Pareto improvement) only if that market imperfection was the only market imperfection. If there are " n " market imperfections, removing all " n " will improve welfare, but removing fewer than " n " may decrease welfare.

In the context of this class, removing (that is, optimally regulating) all externalities would be good, but there is no guarantee that removing fewer than all externalities would be good.

Optional: I gave the example in class that NAFTA's removal of US-Mexican tariff barriers might hurt welfare by increasing the output of U.S. corn growers, whose negative externalities are not optimally regulated, while putting out of business Mexican corn growers whose more primitive production methods are better for the environment.

②



MEC: Marginal External Cost

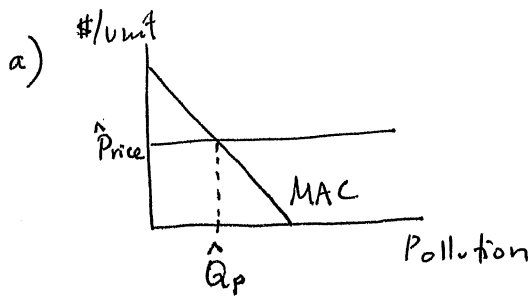
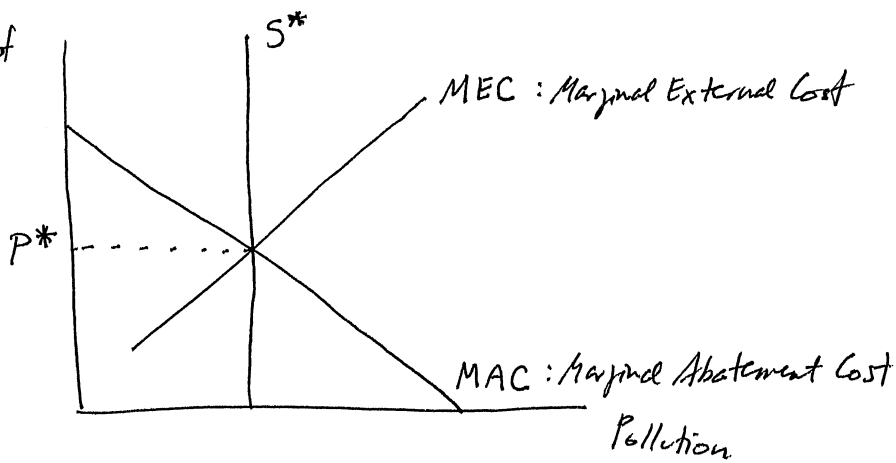
MNPB: Marginal Net Private
Benefit

Let the subsidy (per unit of output not produced) be the lower-case Greek letter sigma, written " σ ." Units of output whose MNPB is less than σ will not be produced

(because producing them only yields MNPB to the firm, while

not producing them yields σ to the firm). So the firm will reduce output to Q^* , which is the so-called optimal level of output because there $MNPB = MEC$.

③ #/unit of pollution



Suppose the price of a permit is \hat{P}_{price} an arbitrary price. For a quantity of pollution less than \hat{Q}_p , abatement (at the margin) is more costly than buying

a permit: $MAC > \hat{P}_{price}$. So those units are not abated, and \hat{Q}_p permits need to be bought (they are "demanded"). For pollution levels above \hat{Q}_p , $MAC < \hat{P}_{price}$, so it is cheaper to abate than to pay \hat{P}_{price} for a permit, and all those units will be abated. Hence the firm demands exactly \hat{Q}_p permits.

b) As above, equating MEC and MAC. The government supplies a fixed number of permits.

Pollution levels below S^* should be permitted because their damage (MEC) is less than what it would cost to abate them (MAC).

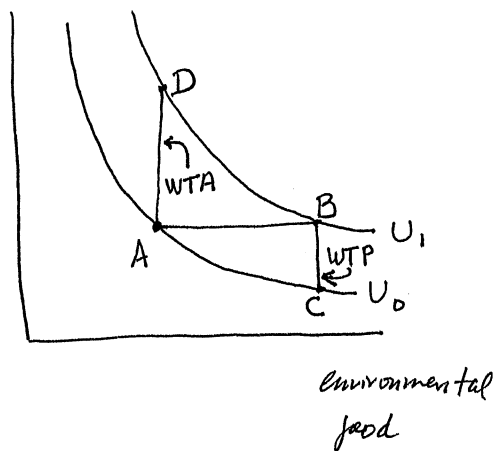
Pollution levels above S^* should not be permitted because their MEC is greater than their MAC. Hence S^* is the optimal level.

c) Unsurprisingly, the intersection of the supply (S^*) and demand (MAC) for permits.

④

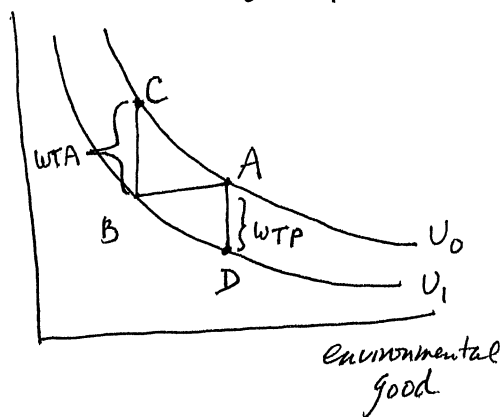
other goods

Gain: $U_0 \rightarrow U_1$



other goods

Loss: $U_0 \rightarrow U_1$



In exchange for an improvement of "environmental good" from A to B, this consumer would be "willing to pay" (WTP) "BC" amount of other goods. If the environmental good is not increased, the consumer would need to receive "WTA" to make him as happy as if he had gone to "B."

Because the indifference curves are not straight parallel lines, $WTA \neq WTP$.

In exchange for not being moved from A to B, the consumer would be "willing to pay" ("WTP") \overline{AD} other goods. If the consumer is moved from A to B, he'd have to be paid "WTA" in other goods to make him as happy as he was before.

In this graph, $WTP \neq WTA$.

(Answer this \uparrow or that \uparrow .)

⑤ The opinion, adopted as formal European Union ("EU") policy, that property rights to use air and water do not belong to the polluter, so he will have to pay for the right to use air or water as a waste deposit site.

This "principle" is an opinion, not a fact, because there is nothing "factual" about who should have the property rights; they could be assigned to the polluter with just as much economic justification. As a statement of opinion, it is neither "true" nor false.

⑥

Utilitarian: the sum total of individuals' utilities should be maximized.

Contractarian: Making a "social contract" behind a "veil of ignorance," citizens will choose egalitarianism because they are risk averse (& therefore worried about their fate if they turned out to be at the "bottom" of an unequal society).

Libertarian: A "just" society enforces a small set of fundamental rights for everyone, and otherwise does not interfere with private actions.